

REMARKS

Applicant has amended the drawings to add the legend "Prior Art" to Figs. 1A-1F, 2A-2G, and 3A-3E. Claims 1-19 remain pending and under examination.

Regarding the Office Action:

In the Office Action, the Examiner objected to the drawings; rejected claims 1-7 and 10-17 under 35 U.S.C. § 103(a) as being unpatentable over admitted prior art ("APA") in view of Yamazaki et al. (U.S. Patent No. 6,589,829) ("Yamazaki"), Paton et al. (U.S. Patent No. 6,797,614) ("Paton"), and Skee (U.S. Patent No. 6,599,370) ("Skee"); and rejected claims 8, 9, 18, and 19 under 35 U.S.C. § 103(a) as being unpatentable over APA and Yamazaki, Paton, and Skee, and further in view of Einav (U.S. Patent No. 6,720,617) ("Einav"). Applicant traverses the rejections for the following reasons.¹

Amendment to the Drawings:

Applicant has amended Figs. 1A-1F, 2A-2G, and 3A-3E to include the legend "Prior Art." Accordingly, Applicant files herewith three (3) sheets of drawings, labeled "Replacement Sheet," containing amended Figs. 1A-1F, 2A-2G, and 3A-3E. Applicant requests that these replacement sheets be made of official record. If the drawings are not in full compliance with the pertinent statutes and regulations, please advise the undersigned.

Rejection of Claims 1-7 and 10-17 under 35 U.S.C. § 103(a):

Applicant respectfully traverses the rejection of claims 1-7 and 10-17 under 35 U.S.C. § 103(a) as being unpatentable over APA in view of Yamazaki, Paton, and Skee. Applicant

¹ The Office Action may contain statements characterizing the related art, case law, and claims. Regardless of whether any such statements are specifically identified herein, Applicant declines to automatically subscribe to any statements in the Office Action.

disagrees with the Examiner's arguments and conclusions. A *prima facie* case of obviousness has not been established.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). M.P.E.P. § 2142, 8th Ed., Rev. 3 (August 2005), p. 2100-134.

A *prima facie* case of obviousness has not been established because, among other things, APA in view of Yamazaki, Paton, and Skee, does not teach or suggest each and every element of Applicant's claims. Specifically, the first requirement for establishing a *prima facie* case of obviousness has not been established, because APA, Yamazaki, Paton, and Skee, taken alone or in combination, do not teach or suggest each and every element of Applicant's independent claims 1 and 10.

The Examiner admitted that APA "does not disclose: the concentration of the arsenic implant at a concentration of $[1 \times 10^{20} \text{ cm}^{-3}]$ or more; and the use of a second heat treatment, at less than 400 [°C] which forms Ni₂Si[,], the higher temperature heat treatment performed after unreacted metal is removed, and the removal of surface arsenic by use of an alkaline liquid" (Office Action, p. 4).

To compensate for these deficiencies, the Examiner alleged that Yamazaki "teaches the use of a second heat treatment, at less than 400 [°C] which forms Ni₂Si[,], the higher temperature heat treatment performed after unreacted metal is removed, and the removal of surface arsenic by

use of an alkaline liquid” (Office Action, p. 4). An examination of Yamazaki, however, proves this allegation to be incorrect.

First, the Examiner offers no citation to Yamazaki in support of these allegations. Second, there is no teaching or suggestion in Yamazaki of a second heat treatment. Third, Yamazaki does not teach or suggest the deposition of, or any use whatsoever, of nickel (Ni). Fourth, Yamazaki does not teach or suggest any formation, or removal, of surface arsenic (As) as in the claimed “arsenic compound layer on a surface” of “a nickel monosilicide (NiSi) film” (claim 1). Therefore, Yamazaki cannot teach or suggest at least Applicant’s claimed “*depositing nickel metal* over the entire top surface of the silicon substrate” (claim 1, emphasis added). Because Yamazaki does not teach or suggest anything about Ni, it cannot subsequently teach or suggest

heat-treating said silicon substrate having said nickel metal deposited thereon at a first temperature of less than 400°C while leaving said nickel metal on the surface of said element isolating insulation film, thereby forming a nickel silicide film containing di-nickel silicide (Ni₂Si) on a surface of said the diffusion region;

removing an unreacted portion of said nickel metal deposited on said element isolating insulation film;

heat-treating said silicon substrate having said unreacted nickel metal removed therefrom at a second temperature of 450°C or more, thereby forming a nickel monosilicide (NiSi) film having an arsenic compound layer on a surface thereof;

etching away said arsenic compound layer by using an alkaline liquid ...
(claim 1, emphasis added).

The Examiner further alleged that Paton “teaches a silicide process that is advantageous for improved stability and suitable resistance for silicide regions on the IC substrate [...] providing a nickel alloy layer [...]” (Office Action, p. 5). Paton, however, does not cure the deficiencies of Yamazaki or APA. Specifically, there is no teaching or suggestion anywhere in

Paton regarding As, whether by depositing, implanting, doping, or any other process. Because Paton does not even mention As, it is impossible for Paton to teach or suggest at least the claimed “forming a nickel monosilicide (NiSi) film *having an arsenic compound layer on a surface thereof; etching away said arsenic compound layer by using an alkaline liquid ...*” (claim 1, emphasis added).

Moreover, the Examiner applied Skee to allegedly teach “removal of organic and inorganic compositions from substrates without damaging the integrated circuits” (Office Action, p. 6). This is presumably applied against Applicant’s claimed “etching away said arsenic compound layer by using an alkaline liquid ...” (claim 1). However, Skee also does not contain any teaching or suggestion anywhere regarding As. Therefore, Skee cannot teach or suggest “*an arsenic compound layer on a surface thereof; etching away said arsenic compound layer by using an alkaline liquid ...*” (claim 1, emphasis added).

Thus, it is clear that the deficiencies of APA, Yamazaki, Paton, and Skee actually *compound*, and therefore fail to teach or suggest at least the above-quoted elements of independent claim 1 (and similar elements recited in independent claim 10). For at least this reason, the Examiner has not established a *prima facie* case of obviousness regarding independent claims 1 and 10.

Moreover, *prima facie* obviousness has not been established at least because the requisite motivation to combine APA, Yamazaki, Paton, and Skee is lacking. The Federal Circuit has noted that “virtually all [inventions] are combinations of old elements.” *See e.g., In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457 (Fed. Cir. 1998) (internal citations omitted). The Federal Circuit has explained that an Examiner may find every element of a claimed invention in the prior art, but mere identification is not sufficient to negate patentability. *See Id.* The court

explained that “the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed.” Id.

Also, determinations of obviousness must be supported by evidence on the record. *See In re Zurko*, 258 F.3d 1379, 1386 (Fed. Cir. 2001), 59 USPQ2d 1693, 1696-98 (finding that the factual determinations central to the issue of patentability, including conclusions of obviousness by the Board, must be supported by “substantial evidence”). The desire to combine or modify references must be proved with “substantial evidence” that is a result of a “thorough and searching” factual inquiry. *See In re Lee*, 277 F.3d 1338, 1343-1344 (Fed. Cir. 2002), 61 USPQ2d 1430, 1433 (quoting *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351-52). Additionally, the Federal Circuit has clearly stated that the evidence of a motivation or suggestion to modify a reference must be “clear and particular.” *In re Dembicziak*, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999).

In this case, the Office Action does not show that a skilled artisan considering APA, Yamazaki, Paton, and Skee, and not having the benefit of Applicant’s disclosure, would have been motivated to combine the references in a manner resulting in Applicant’s claimed combination. The Examiner merely provided descriptions of how the references allegedly teach certain features without providing “clear and particular” reasons why a skilled artisan “would select the elements from the cited prior art references for combination in the manner claimed.” *See In re Dembicziak*, 175 F.3d at 999, 50 USPQ2d at 1617; *In re Rouffet*, 149 F.3d at 1357, 47 USPQ2d at 1457.

For example, the Examiner alleged that “it would have been obvious [to combine APA and Yamazaki, because] both teach [...] lower electric resistance capable of suppressing the

generation of the junction leak” (Office Action, p. 5); “[i]t would have been obvious [to combine APA and Yamazaki with Paton to] improve stability with suitable resistance for silicide regions on the IC substrate” (Office Action, pp. 5-6); and “[i]t would have been obvious [to combine APA, Yamazaki, and Paton with Skee] because Skee teaches such compositions remove unwanted contaminants and/or residues from the substrate surface” (Office Action, p. 6). Contrary to the Examiner’s allegations, she has not shown that one of ordinary skill in the art would have been motivated to combine APA, Yamazaki, Paton, and Skee, viewing only teachings from within these references themselves, in a manner resulting in Applicant’s claimed invention.

First, whether APA and Yamazaki teach “lower electric resistance capable of suppressing the generation of the junction leak” (Office Action, p. 5) does not determine whether one of ordinary skill in the art would have been motivated to combine APA and Yamazaki to produce the claimed invention. APA and Yamazaki do not lend themselves to combination, especially since Yamazaki does not contain any teaching or suggestion whatsoever of the use of Ni in silicides or an arsenic compound layer on the surface of a Ni-silicide.

Second, whether APA, Yamazaki, and Paton teach improving “stability with suitable resistance for silicide regions on the IC substrate” (Office Action, p. 6) does not determine whether one of ordinary skill in the art would have been motivated to combine APA, Yamazaki, and Paton to produce the claimed invention. APA, Yamazaki, and Paton also do not lend themselves to combination, especially since Paton does not contain any teaching or suggestion whatsoever of the use of As.

Third, whether Skee teaches removal of “unwanted contaminants and/or residues from the substrate surface” (Office Action, p. 6) does not determine whether one of ordinary skill in

the art would have been motivated to combine Skee with APA, Yamazaki, and Paton to produce the claimed invention. Skee does not lend itself to combination with APA, Yamazaki, and Paton, especially since Skee also does not contain any teaching or suggestion whatsoever of the use of As.

Thus, these allegations in the Office Action are not properly supported and do not show motivation for a skilled artisan to combine the references as the Examiner has alleged. The Examiner does not show the alleged motivation to be present in the applied references or in the knowledge available to one of ordinary skill in the art.

Applicant directs the Examiner's attention to M.P.E.P. § 2143.01, which makes clear that: "[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination" (citations omitted). The Examiner has not shown that the cited art "suggests the desirability" of the alleged combination.

Applicant also notes that "[i]n determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. M.P.E.P. § 2141.02 (citing *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *Schenck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983)). Here, the Examiner has not shown that independent claims 1 and 10, as a whole, would have been obvious in view of APA, Yamazaki, Paton, and Skee.

Applicant therefore submits that the Examiner is impermissibly using teachings of the present application in hindsight to piece together otherwise isolated disclosures of the cited references. The Examiner, however, may not pick and choose among isolated disclosures in

references to defeat patentability of the claimed invention. Such picking and choosing amounts to improper hindsight reconstruction, which is prohibited. *See In re Fine*, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988).

For at least these additional reasons, *prima facie* obviousness of independent claims 1 and 10 has not been established. Independent claims 1 and 10 are therefore allowable, for the reasons argued above, and dependent claims 2-7 and 11-17 are also allowable at least by virtue of their respective dependence from allowable base claim 1 or 10. Therefore, Applicant requests that the improper 35 U.S.C. § 103(a) rejection be withdrawn.

Rejection of Claims 8, 9, 18, and 19 under 35 U.S.C. § 103(a):

Applicant respectfully traverses the rejection of claims 8, 9, 18, and 19 under 35 U.S.C. § 103(a) as being unpatentable over APA in view of Yamazaki, Paton, and Skee, and further in view of Einav. Applicant disagrees with the Examiner's arguments and conclusions. A *prima facie* case of obviousness has not been established.

Applicant has already demonstrated in the previous section that APA in view of Yamazaki, Paton, and Skee, taken alone or in combination, fail to teach or suggest all the elements of independent claims 1 and 10.

The Examiner's application of Einav, however, for its "technique [which] enables [one] to obtain the width-to-length ratio [of] about 100, which results in the significant reduction of the voltage supply" (Office Action, p. 8), fails to cure the deficiencies of APA, Yamazaki, Paton, and Skee already discussed. That is, Einav also fails to teach or suggest at least the claimed

*depositing nickel metal over the entire top surface of the silicon substrate;
heat-treating said silicon substrate having said nickel metal deposited
thereon at a first temperature of less than 400°C while leaving said nickel metal
on the surface of said element isolating insulation film, thereby forming a nickel*

silicide film containing di-nickel silicide (Ni_2Si) on a surface of said the diffusion region;

removing an unreacted portion of said nickel metal deposited on said element isolating insulation film;

heat-treating said silicon substrate having said unreacted nickel metal removed therefrom at a second temperature of 450°C or more, thereby forming a nickel monosilicide (NiSi) film having an arsenic compound layer on a surface thereof;

etching away said arsenic compound layer by using an alkaline liquid ... (claim 1, emphasis added).

Thus, even if Einav were combined with APA, Yamazaki, Paton, and Skee, as the Examiner suggests, Einav does not cure their deficiencies and does not teach or suggest all elements recited in independent claims 1 and 10 and required by dependent claims 8, 9, 18, and 19. Therefore, the Examiner's application of Einav as an additional reference does not render obvious the recitations of Applicant's dependent claims 8, 9, 18, and 19.

Applicant has therefore established that the cited references, taken alone or in combination, do not teach or suggest each and every element of independent claims 1 and 10. Accordingly, the Examiner's reliance on the cited references fails to establish *prima facie* obviousness of dependent claims 8, 9, 18, and 19. Dependent claims 8, 9, 18, and 19 are allowable at least by virtue of their respective dependence from allowable base claim 1 or 10. The improper 35 U.S.C. § 103(a) rejection should be withdrawn.

Conclusion:

In view of the foregoing, Applicant requests reconsideration of the application and withdrawal of the objection and rejections. Pending claims 1-19 are in condition for allowance, and Applicant requests a favorable action.

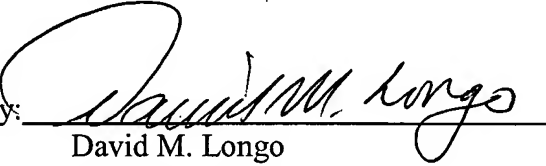
If there are any remaining issues or misunderstandings, Applicant requests the Examiner telephone the undersigned representative to discuss them.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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GARRETT & DUNNER, L.L.P.

Dated: December 13, 2005

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